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NOTICE OF ALLOWANCE AND FEE(S) DUE

48150	7590	01/02/2009

MCGINN INTELLECTUAL PROPERTY LAW GROUP, PLLC
8321 OLD COURTHOUSE ROAD
SUITE 200
VIENNA, VA 22182-3817

EXAMINER
WEI, ZHENG

ART UNIT	PAPER NUMBER
2192	

DATE MAILED: 01/02/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,937	09/29/2003	Fred Gehrung Gustavson	YOR920030171US1	8297

TITLE OF INVENTION: METHOD AND STRUCTURE FOR PRODUCING HIGH PERFORMANCE LINEAR ALGEBRA ROUTINES USING PRELOADING OF FLOATING POINT REGISTERS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	04/02/2009

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: <u>Mail</u>　Mail Stop ISSUE FEE
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

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Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

_____ (Depositor's name)

_____ (Signature)

_____ (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,937	09/29/2003	Fred Gehrung Gustavson	YOR920030171US1	8297

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APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	04/02/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
WEI, ZHENG	2192	717-151000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE
(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) :　☐ Individual　☐ Corporation or other private group entity　☐ Government

4a. The following fee(s) are submitted:
☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)
☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)
☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____　Date _____

Typed or printed name _____　Registration No. _____

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Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 745 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 745 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

	Application No.	Applicant(s)
Notice of Allowability	10/671,937	GUSTAVSON ET AL.
	Examiner	Art Unit
	ZHENG WEI	2192

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to <u>10/10/2008</u>.

2. ☒ The allowed claim(s) is/are <u>1-19 and 21 (re-numbered as 1-20)</u>.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

        a) ☐ All   b) ☐ Some*   c) ☐ None   of the:

              1. ☐ Certified copies of the priority documents have been received.

              2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

              3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application

6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____.

/Tuan Q. Dam/
Supervisory Patent Examiner, Art Unit 2192

DETAILED ACTION

Remarks

1.   This office action is in response to the amendment filed on 10/10/2008.

2.   Claim 20 has been cancelled by the Applicants.

3.   Claim 21 has been added

4.   Claims 1, 6 and 12-17 have been amended by the Applicants.

5.   Claims 1, 5, 6, 10, 12, 16, 17 and 19 are now being further amended by the

      Examiner.

6.   Claims 1-19 and 21 remain pending and now being allowed (re-numbered as

      claims 1-20)

EXAMINER'S AMENDMENT

7.   An examiner's amendment to the record appears below. Should the changes

      and/or additions be unacceptable to applicant, an amendment may be filed as

      provided by 37 CFR 1.312. To ensure consideration of such an amendment, it

      MUST be submitted no later than the payment of the issue fee.

8.   Authorization for this examiner's amendment was given in a telephone interview

      with Frederick E. Cooperider (Reg# 36,769) on 12/23/2008 and 12/29/2008 to

      obviate any potential 35 U.S.C. § 112 issues, and to put the claims in condition

      for allowance.

9.   The application has been amended as follows:

IN THE CLAIMS

Please amend claims 1, 5, 6, 10, 12, 16, 17, and 19, as followings:

Claim 1 (Currently amended):

A software method of improving at least one of efficiency and speed in executing a linear algebra subroutine on a computer having a floating point unit (FPU) with floating point registers (FRegs) and a load/store unit (LSU) capable of overlapping loading data and processing said data by the FPU, said FPU being interfaced with an L1 (Level 1) cache and having an L1 cache/FReg interface "loading penalty of n cycles", n being an integer greater than or equal to 1, during which data is rearranged in up to n cycles in said FRegs because data arrives out of order for said processing, said method comprising:

loading matrix data from a memory through a cache system at a fastest possible rate; and

then either immediately or at a later time, for an execution code controlling operation of said linear algebra subroutine execution, overlapping by preloading data into said FRegs of said FPU and then rearranging the data in said FRegs for up to said n cycles, said overlapping causing said matrix data to arrive into said FRegs from said L1 cache to be timely executed by the FPU operations of said linear algebra subroutine on said FPU.

Claim 5 (Currently amended):

The method of claim 4, wherein said LAPCK subroutine comprises a <u>Level</u>

<u>3 Basic Linear Algebra Subprograms (BLAS) which includes L1 cache kernel</u>

<u>routines</u> ~~BLAS Level 3 L1 cache kernel~~ .

Claim 6 (Currently amended):

An apparatus, comprising:

a memory to store matrix data to be used for processing in a linear

algebra program;

an L1 <u>(Level 1)</u> cache to receive data from said memory;

a floating point unit (FPU) to perform said processing; and

a load/store unit (LSU) to load data to be processed by said FPU, said

LSU loading said data into a plurality of floating point registers (FRegs), wherein

said data processing overlaps said data loading such that matrix data is

preloaded into said FRegs from said L1 cache prior to being required by said

FPU and the preloaded data in said FRegs is rearranged for up to *n cycles, n*

being an integer greater than or equal to 1.

Claim 10 (Currently amended):

The apparatus of claim 9, wherein said subroutine comprises a <u>Level 3</u>

<u>Basic Linear Algebra Subprograms (BLAS) which includes L1 cache kernel</u>

<u>routines</u> ~~BLAS Level 3 L1 cache kernel~~.

Claim 12 (Currently amended):

A computer-readable storage medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to perform a method of improving at least one of speed and efficiency in executing a linear algebra subroutine on a computer having a floating point unit (FPU) and a load/store unit (LSU) capable of overlapping loading data and processing said data, said method comprising:

for an execution code controlling operation of said linear algebra subroutine execution, overlapping by preloading data into a floating point registers (FRegs) of said FPU and rearranging the preloaded data in said FRegs for up to n cycles, where n is an integer greater than or equal to 1, said overlapping causing data from an L1 (Level 1) cache to arrive into said FRegs, to be timely executed by FPU operations of said linear algebra subroutine on said FPU in view of said up to n cycles used for rearranging said preloaded data.

Claim 16 (Currently amended):

The system of claim 15, wherein said subroutine comprises a Level 3 Basic Linear Algebra Subprograms (BLAS) which includes L1 cache kernel routines ~~BLAS Level 3 L1 cache kernel~~ .

Claim 17 (Currently amended):

A method of providing a service involving at least one of solving
and applying a scientific/engineering problem, said method comprising ~~at least
one of~~:

using a linear algebra software package that computes one or more matrix
subroutines, wherein said linear algebra software package generates an
execution code controlling a load/store unit loading data into a floating point
registers (FRegs) for a floating point unit (FPU) performing a linear algebra
subroutine execution, said FPU capable of overlapping loading data and
performing said linear algebra subroutine processing, such that, for an execution
code controlling operation of said FPU, said overlapping causes a preloading
of data from an L1 (Level 1) cache into said FRegs and then rearranges said
preloaded data for up to n cycles, n being an integer greater than or equal to 1,
and wherein a stride one data transfer is used for providing said data for said
preloading for all operands without using a data copy processing for correcting
said stride one data transfer for any operand of said linear algebra subroutine;

providing a consultation for purpose of solving a scientific/engineering
problem using said linear algebra software package;

transmitting a result of said linear algebra software package on at least
one of a network, a signal-bearing medium containing machine-readable data
representing said result, and a printed version representing said result; and

receiving a result of said linear algebra software package on at least one

of a network, a signal-bearing medium containing machine-readable data

representing said result, and a printed version representing said result.

Claim 19 (Currently amended):

The method of claim 18, wherein said LAPCK subroutine comprises a

Level 3 Basic Linear Algebra Subprograms (BLAS) which includes L1 cache

kernel routines ~~BLAS Level 3 L1 cache kernel~~ .

--END OF AMENDMENT—

Allowable Subject Matter

Claims 1-19 and 21 are allowed. As Applicants point out in the remarks

filed on 10/10/2008, the closest cited prior art of Nakazawa (US 5,438,669)

and/or Dhablania (US 6,115,730), and/or Mulla (US 6,507,892) fails to teach or

fairly suggest the method and the system for improving efficiency and speed

in executing a linear algebra subroutine on a computer having a floating point

unit (FPU) with floating point registers (FRegs) and a load/store unit (LSU)

capable of overlapping loading data and processing said data by the FPU, said

FPU being interfaced with an L1 (Level 1) cache and having an L1 cache/FReg

interface "loading penalty of n cycles", n being an integer greater than or equal to

1, during which data is rearranged in up to n cycles in said FRegs because data arrives out of order for said processing, said method comprising: loading matrix data from a memory through a cache system at a fastest possible rate; and then either immediately or at a later time, for an execution code controlling operation of said linear algebra subroutine execution, overlapping by preloading data into said FRegs of said FPU and then rearranging the data in said FRegs for up to said n cycles, said overlapping causing said matrix data to arrive into said FRegs from said L1 cache to be timely executed by the FPU operations of said linear algebra subroutine on said FPU as recited in claims 1, 6, 12, and 17. In as such manners independent claims 1, 6, 12, 17 and each of the dependent claims are allowable for at least the same reasons.

10.   Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zheng Wei whose telephone number is (571) 270-1059 and Fax number is (571) 270-02059. The examiner can normally be reached on Monday-Thursday 8:00-15:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on (571) 272-3695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature of relating to the status of this application or proceeding should be directed to the TC 2100 Group receptionist whose telephone number is 571- 272-1000.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Z. W./   /Tuan Q. Dam/
Examiner, Art Unit 2192   Supervisory Patent Examiner, Art Unit 2192